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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/273,806	03/22/1999	KENNETH J. DUDA	CIS-057	7598

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EXAMINER

NGUYEN, VAN H

ART UNIT PAPER NUMBER

2126

DATE MAILED: 12/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<p align="center">Office Action Summary</p>	Application No. 09/273,806	Applicant(s) DUDA ET AL	
	Examiner VAN H NGUYEN	Art Unit 2126	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 6/24/04.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-57 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-57 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-57 are presented for examination.

Claim Rejections - 35 USC § 101

2. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

3. Claims 1-54 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.
4. As to claim 1, the claim reads on a mental process or the manipulation of an abstract idea. The claim limitations are not explicitly directed toward steps being implemented on a computer, computer readable medium, or other statutory device. As such, they could be carried out mentally in conjunction with pen and paper. The claimed steps do not define a machine or computer implemented process (see MPEP 2106). Therefore, the claimed invention is directed to non-statutory subject matter. (The Examiner suggest Applicant to change "a scheduling method" to "a computer implemented method for scheduling" in the preamble to overcome the outstanding 35 U.S.C. 101 rejection.
5. As to claim 30, the language of the claim (i.e., a scheduling apparatus" raises a question as to whether the claims are directed merely to an abstract idea that is not tied to a

Art Unit: 2126

technological art, environment or machine which would result in a practical application producing a concrete, useful, and tangible result to form the basis of statutory subject matter under 35 USC § 101. (The Examiner suggest Applicant to change “a scheduling apparatus” to “a scheduling apparatus for scheduling computer resource among a plurality of elements” in the preamble to overcome the outstanding 35 U.S.C. 101 rejection.)

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-15, 30-44, and 55-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Jones et al.** (U.S. 5, 812,844).

8. **As to claim 1:**

- a. Jones teaches the invention substantially as claimed including a scheduling method (*e.g., scheduling the execution; see the abstract*) comprising the steps of:
scheduling a resource among a plurality of elements (*e.g., scheduling the execution of a plurality of threads; see the abstract; scheduler to schedule the*

use of one or more processors...schedule the use of other resources; col.5, lines 1-5) by:

- (i) detecting expiration of a period-of-use of the resource, the resource allocated to an active one of the plurality of elements for the period-of-use (*col.4, line 62-col.5, line 29 and col.7, lines 19-54*); and
 - (ii) updating a measure-of-use of the resource for the active one of the plurality of elements responsive to the period-of-use and a measure-of-use adjustment (*fig. 7 and associated text*).
- b. Jones does not explicitly teach “assigning one of the plurality of elements to use the resource for a second period-of-use responsive to the measure-of-use and an element-specific selection adjustment for each element in the plurality of elements.”
- c. It would have been obvious to one of ordinary skill in the art to have applied the teachings of Jones for *the assigning step* in order to provide a means for efficiently allocating the processor to a thread for the appropriate amount of time without having to interrupt the thread to reevaluate the schedule.
- d. The fact that Jones’ teachings “*the scheduler recalculates the restart time for the thread on the processor list*” (col.11, lines 45-46) and *the scheduler moves the thread on the processor list to the ready list, and moves the thread having the earliest restart time on the ready list to the processor list*” (col.12, lines 1-28), and “*recalculates the restart time for the thread*” “*moves the thread*” in Jones

suggest “*an element-specific selection*” and “*assigning one of the plurality of elements.*”

9. **As to claim 2:**

Jones teaches the period-of-use is a scheduled period-of-use (*col.5, lines 57-65 and col.12, lines 1-28*).

10. **As to claim 3:**

Jones teaches the plurality of elements is a plurality of threads of-execution and the resource is time available to a central processor unit to execute the plurality of threads-of-execution (*abstract and col.6, lines 56-67*).

11. **As to claim 4:**

Jones teaches updating a virtual time for the active one of the plurality of threads-of-execution responsive to the period-of-use (*fig. 7 and associated text*); and wherein the step of assigning one of the plurality of elements further includes determining an effective virtual time responsive to the virtual time and the element- specific selection adjustment where the element-specific selection adjustment is a borrowed virtual time (*col.12, lines 1-28*).

12. **As to claim 5:**

Jones teaches specifying the borrowed virtual time by one of the plurality of threads-of-execution (*col.9, line 32-col.10, line 24*).

13. **As to claim 6:**

Art Unit: 2126

Jones teaches adding a new thread to the plurality of threads-of-execution by a parent thread; and initializing the virtual time for the new thread using the virtual time of the parent thread (*col.col.11, line 26-col.12, line 28*).

14. **As to claim 7:**

Jones teaches the plurality of threads-of-execution includes a set of ready threads and a set of blocked threads (*figs. 9C-9D and associated text*).

15. **As to claim 8:**

Jones teaches adjusting each of the set of blocked threads by an adjustment value (*figs. 9C-9D and associated text*).

16. **As to claim 9:**

Jones teaches updating a system reference-use of the resource (*fig. 2 and associated text*).

17. **As to claim 10:**

Jones teaches determining that one of the set of blocked threads has become ready; and updating, responsive to the step of determining, a virtual time for the one of the set of blocked threads or to the system reference-use as adjusted by a lag limit (*figs. 9C-9D and associated text*).

18. **As to claim 11:**

Jones teaches (a) determining that one of the set of blocked threads had become blocked; (b) saving the system reference-use and a current real-time value associated with the one of the set of blocked threads; (c) determining that the one of the set of blocked threads has become ready; and (d) updating a virtual time for the one of the set of blocked threads responsive to step (c) and further responsive to the saved system reference-use,

Art Unit: 2126

the saved current real-time, and the system reference-use (*figs. 9C-9D and associated text*).

19. **As to claim 12:**

Jones teaches the system reference-use is updated to converge towards a virtual time average over the set of ready threads (*figs. 9C-9D and associated text*).

20. **As to claim 13:**

Jones teaches the step of updating the system reference-use is accomplished substantially in accordance with:

reference-use=max(reference-use,
min(reference-use+R+RCost, EVT));

where reference-use is the system reference-use, R is a convergence rate, RCost is a resource usage, and EVT is an effective virtual time, and the resource usage is a function of the period-of-use and the measure-of-use adjustment assigned to the active one of the plurality of threads-of-execution (*fig. 7 and associated text*).

21. **As to claim 14:**

Jones teaches the step of updating the system reference-use is accomplished substantially in accordance with:

reference-use += max(-MaxChange,
min(MaxChange, meanAVT-reference-use));

where reference-use is the system reference-use, MaxChange is responsive to a resource usage, and MeanAVT is an average AVT over a set of the plurality of elements, and the resource usage is a function of the period-of-use and the measure-of-use adjustment

Art Unit: 2126

assigned to the active one of the plurality of threads of-execution (*fig. 7 and associated text*).

22. As to claim 15:

Jones teaches adding a new thread to the plurality of threads-of-execution; and initializing the virtual time for the new thread using the system reference use (*col.col.11, line 26-col.12, line 28*).

23. As to claims 30-44:

Note the rejection of claims 1-15 above. Claims 30-44 are the same as claims 1-15, except claims 30-44 are apparatus claims and claims 1-15 are method claims.

24. As to claims 55-57:

Note the rejection of claims 1-3 above. Claims 55-57 are the same as claims 1-3, except claims 55-57 are computer program product claims and claims 1-3 are method claims.

25. Claims 16-29 and 45-54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al. in view of Chow et al. (U.S. 6,438,134 B1).

26. As to claim 16:

- a. Jones does not explicitly teach the plurality of elements is a plurality of queues and the resource is the bandwidth of an output port of a data switch.
- b. Chow teaches the plurality of elements is a plurality of queues and the resource is the bandwidth of an output port of a data switch (*abstract and col.col.3, lines 16-47*).

Art Unit: 2126

- c. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teachings of Jones and Chow because Chow's plurality of queues and the resource is the bandwidth of an output port of a data switch would have provided a more efficient bandwidth distribution to Jones's system by giving fair scheduling to multiple queues (col.12, lines 49-60).

27. **As to claim 17:**

The rejection of claim 4 above is incorporated herein in full. Claim 17 further recites the plurality of queues. In addition, Chow teaches the plurality of queues (*14A, 14B, 14C; fig.3*).

28. **As to claim 18:**

Chow teaches the period-of-use is a transmission time period required to transfer one or more data packets from one of the plurality of queues to the output port (*fig. 4 and associated text*).

29. **As to claim 19:**

- a. Chow teaches the plurality of queues includes a set of non-empty queues and a set of empty queues (*col.6, lines 13-39*).
- b. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teachings of Jones and Chow because Chow's plurality of queues and the resource is the bandwidth of an output port of a data switch would have provided a more efficient bandwidth distribution to Jones's system by giving fair scheduling to multiple queues (col.12, lines 49-60).

30. **As to claim 20:**

It includes the same limitation as claim 7 above, and is similarly rejected under the same rationale.

31. **As to claim 21:**

Chow teaches (a) determining that one of the set of non-empty queues has become empty; (b) saving the system reference-use and a current real-time value associated with the now-empty queue; (c) determining that the now-empty queue has become non-empty; and (d) updating a virtual time for the now-non-empty queue responsive to step (c) and further responsive to the saved system reference-use, the saved current real time, and the system reference-use (*fig.6 and associated text*).

32. **As to claim 22:**

Chow teaches the system reference-use is updated to converge towards a virtual time average over the non-empty queues (*fig.6 and associated text*).

33. **As to claim 23:**

- a. The rejection of claim 13 above is incorporated herein in full. Claim 23 further recites a weight assigned to the active one of the plurality of queues.
- b. Chow teaches a weight assigned to the active one of the plurality of queues (*col.12, lines 27-65*).

34. **As to claim 24:**

- a. The rejection of claim 14 above is incorporated herein in full. Claim 24 further recites a weight assigned to the active one of the plurality of queues.
- b. Note the discussion of claim 23 above for rejection of “a weight assigned to the active one of the plurality of queues.”

statutory subject matter (2) Jones does not disclose an assignment of an element to a resource responsive to the element specific selection adjustment for each element in a plurality of element.”

41. Examiner respectfully traverses Applicant’s remarks:

- a. As to point (1), contrary to Applicant's contention, the language of the claims raises a question as to whether the claims are directed merely to an abstract idea that is not tied to a technological art, environment or machine which would result in a practical application producing a concrete, useful, and tangible result to form the basis of statutory subject matter under 35 USC § 101.
- b. As to point (2), despite Applicant's assertions, Jones does suggest the recited claim limitations. The aforementioned claim elements are clearly subject to a broad interpretation, as detailed in the rejections maintained above. The Examiner has a *duty* and *responsibility* to the public and to Applicant to interpret the claims *as broadly as reasonably possible* during prosecution (see *In re Prater*, 56 CCPA 1381, 415F.2d 1393, 162 USPQ 541 (1969)).

Conclusion

42. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

35. **As to claim 25:**

- a. The rejection of claim 15 above is incorporated herein in full. Claim 25 adding a new queue to the plurality of queues.
- b. Jones does not explicitly teach adding a new queue to the plurality of queues.
Chow teaches adding a new queue to the plurality of queues (*col.11, lines 46-65*).

36. **As to claim 26:**

Chow teaches adjusting each of the set of empty queues by the adjustment value when the system reference-use is updated (*fig. 6 and associated text*).

37. **As to claims 27-29:**

They include the same limitations as in claims 22-24 and are similarly rejected under the same rationale.

38. **As to claims 45-54:**

Note the rejection of claims 16-29 above. Claims 45-54 are the same as claims 16-29, except claims 45-54 are apparatus claims and claims 16-29 are method claims.

Response to Arguments

39. Applicant's arguments filed June 24, 2004 have been fully considered but they are not persuasive.

40. In the remarks, Applicant argued in substance that (1) the claimed invention is not simply the manipulation of an abstract idea and does not read on a mental process, but is indeed

Art Unit: 2126

43. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.
44. Any inquiry concerning this communication or earlier communications from the examiner should be directed to VAN H. NGUYEN whose telephone number is (571) 272-3765. The examiner can normally be reached on Monday-Thursday from 8:30AM - 6:00PM. The examiner can also be reached on alternative Friday.
45. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai An can be reached on (571) 272-3756.
46. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.
47. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Any response to this action should be mailed to:

Commissioner for patents

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11/24/04

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